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Editorial.

District Economic Councils. Since the formation of the Provincial Economic Council some months ago, the Government have been considering the formation of district councils and their decision on the matter, recently published, provides for the formation of these councils, in every district, as early as possible. The constitution of the council, its functions and the instructions for the guidance of Government Officers making up the council have all been detailed in the Government order, which inter alia states that the function of the council will be advisory. The main task of the council will be to co-ordinate the work of the several Departments of Government in the district, to see that the money allotted to the district for expenditure in each of these Departments is spent to the greatest advantage, and to take such steps as it may find necessary—with the willing co-operation of the people—for the improvement of village life in all its aspects.

The Government have also rightly decided that the setting up of these councils should be decided on by the people of the districts themselves, and their order outlines the procedure to be followed by the Collector of each district who will be the President of the council. It is unlikely that any of the districts would be unwilling to avail itself of the obvious advantages of a scheme which brings the different branches of Government Administration to co-operate with one another and with the people. The constitution of the council allows for non-official representation in it; probably, two non-official members will be considered not sufficient. A good deal will depend

upon the right choice of the non-official representatives who should be able to command the willing co-operation of the people in the villages. The Government we find, lay stress on the important task of the council, to create interest in and desire for improvement, among the villagers themselves. The council will find it necessary first to make a survey of the possibilities of village improvement work that could be undertaken in various parts of the district, select villages which give promise of success and later on build up new centres based on experience gained at the centres first chosen. The other day, the Viceroy of India addressing the Advisory Board of the Imperial council of Agricultural Research stated " I cannot but feel that the establishment of a greater degree of co-ordination than would appear at present to exist between district officers and the officers of the Agricultural, Veterinary and Co-operative departments, would strengthen materially the means at disposal for promoting agricultural improvement as well as rural betterment in the widest sense". We are sure that the formation of the District Economic Councils would help in bringing about this much desired co-ordination of activities.

We are glad that the programme of rural reconstruction is made to include practically every item connected with village life, even relief of indebtedness. There have been attempts made at rural reconstruction work by other agencies like the Y. M. C. A, Servants of India Society etc. in selected centres here and there, and we hope that this new Government organisation, will heartily co-operate with these other agencies and benefit by the experience already gained by them.

Imperial Council of Agricultural Research. The Imperial Council of Agricultural Research was brought into existence seven years ago as a result of the Government of India accepting one of the most important of the recommendations of the Royal Commission on Agriculture in India. The investigations of the Commission had shown the growing decline in co-ordination between the centre and the Provinces and between Province and Province due evidently to the Constitutional changes that had been introduced, and it was with a view to counteract this tendency that the Commission had recommended the establishment of the Imperial Council. It was intended to promote, guide and co-ordinate agricultural research throughout India and to link it with agricultural research in other parts of the British Empire and in foreign countries. There is no doubt that the Council during the last seven years has justified the purpose, for which it was started.

The Council has so far spent several lakhs of rupees in financing several research schemes in the different Provinces and in the Centre. The Government of India have now secured the services of two eminent British Experts to visit India this cold weather and give them the benefit of their expert advice regarding the working of the Imperial Council of Agricultural Research during the last seven years. Of

these experts Sir John Russell, F. R. S., Director of the Rothamsted Station, will deal with soils and crops and Dr. N. C. Wright of the Hannah Dairy Research Institute, Ayrshire, with dairy and animal husbandry schemes. These experts are to be helped by two Indian Secretaries, R. L. Sethi, Economic Botanist, the United Provinces and Prof. Agarwal of the Punjab Veterinary College. We hope that the experts, will, in addition to examining how far the Research Council has discharged its principal duty of co-ordinating and promoting agricultural research in India, also examine the present research programmes of the Council and advise on the most fruitful lines of research to be undertaken in the future. When a large number of investigations say, on a particular crop, are carried out in the different Provinces, it is inevitable there should be a certain amount of overlapping, but we hope that the Experts after examining the progress of research work in the different Provinces will make such recommendations as would reduce this overlapping to the minimum.

Practical Training in Agriculture. We are glad to note that to relieve unemployment among educated youth, the Government of Madras have, subject to the vote of the Legislative Council, sanctioned a scheme for training one hundred and fifty young men in practical agriculture. Applicants will be required to have at least passed the S. S. L. C. examination and they should belong to land-owning and agricultural classes. The course of training is to last for 4 months beginning from September next and is proposed to be given in one or other of the several Government Agricultural Research Stations. During the course of training they are to get a stipend of Rs. 15 a month and the only condition stipulated is, that they should go back to the land and take to agriculture as their profession. We have in recent times had educated young men volunteering to come and work as regular coolies and learn practical agriculture in the several stations but, it is doubtful whether they seriously intend to go back to the land and take to agriculture. While we welcome this new scheme, we wish it went a little further by providing a selected few of these trained men with lands and facilities to farm on their own account as has been done in the Punjab. We look forward to the success of this inexpensive experiment.

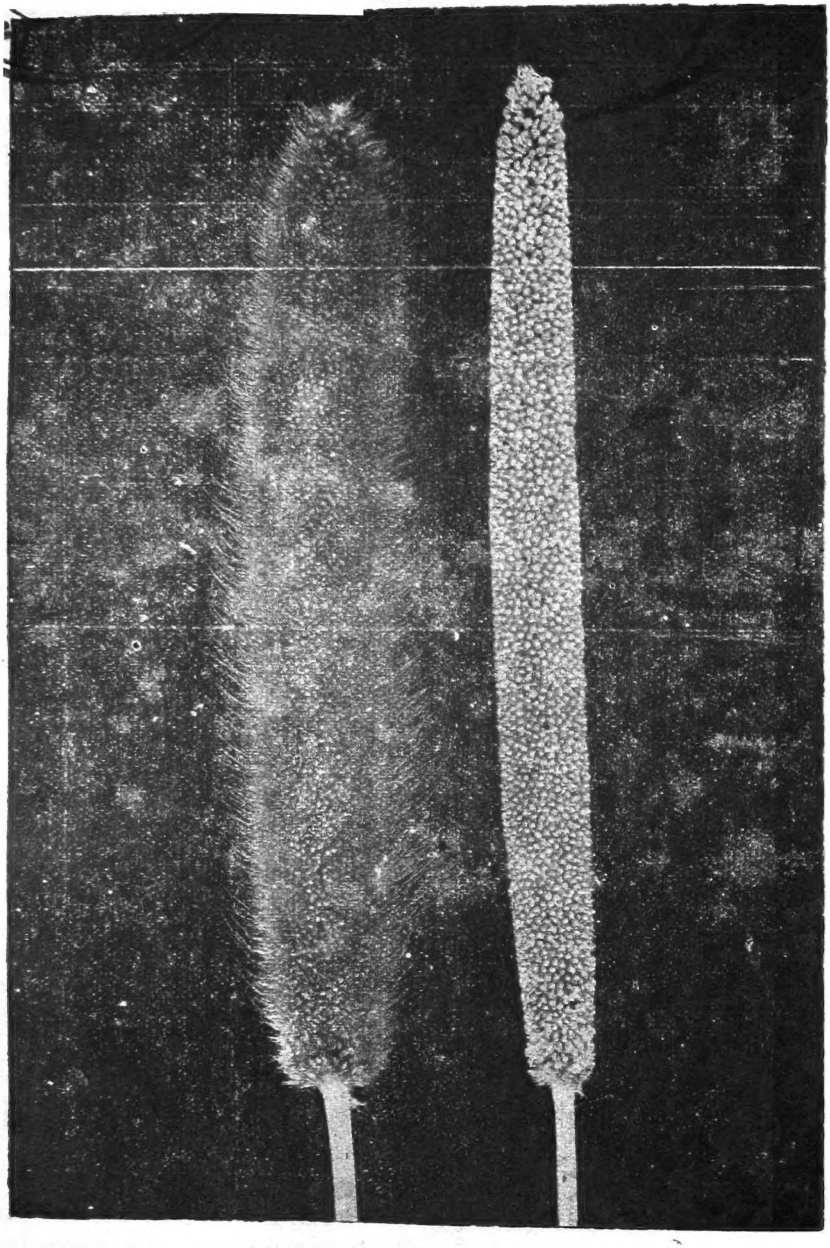
The Cecil Wood Memorial. While we are celebrating the Diamond Jubilee of the commencement of Agricultural Education in Madras and the Silver Jubilee of the Madras Agricultural Students' Union this week, we cannot but think, with pleasant memories, of Cecil Wood who had played such an important part in the activities of the College during his long stay in Madras. There can be no two opinions about Wood as the ideal Principal the College has ever had. Coming out to India in 1905 he had seen service in various capacities in the Madras Agricultural Department, but it was as Principal, which post he held for over twelve years (1909—1922), that he was best

known. Most of his students who are still in the Department, can well remember his boundless enthusiasm for activities in the College and on the field. His lectures on Agriculture were a model and we believe the notes prepared by him then still form the basis for the teaching of Agriculture in the College. Though a strict disciplinarian, he was greatly loved and esteemed by his students. Unfortunately, however, during his later days in Madras, he could not adapt himself to the changing conditions, particularly in the general desire for affiliating the College to the University which he did not quite believe would yield fruitful results. All the same we are sure that if he had continued in Madras, he would have been the first to welcome and appreciate the changes that have been introduced in the College consequent on its affiliation to the University.

Leaving Madras in 1922, he was for a short period employed by the Empire Cotton Growing Corporation in S. Africa, but he soon joined the staff of the Imperial College of Agriculture, Trinidad and took to his most favourite job, namely teaching of agriculture to the students.

It was over six years ago that some of his old students in the Madras Department of Agriculture met and decided to perpetuate the memory of his connection with the College in a suitable manner. A committee was appointed with instructions as to the form in which the memorial was to be instituted. The Secretary of the Committee had issued an appeal in the Journal inviting subscriptions for the Memorial Fund. The Committee, however, could not push through the work entrusted to it for various reasons, one of which was the transfer of most of its members from Coimbatore to the Circles. We find that there has been some activity again and it is but appropriate that something is being done during this year's College Day Celebrations. We are glad to learn that a portrait in oil has been prepared which will be unveiled on the 30th of July by Rao Bahadur D. Ananda Rao, Director of Agriculture, who is about the oldest still in service and who had heen in closest touch with Mr. Wood's activities in Madras. We understand that the presentation of Mr. Wood's portrait to the College is only one of the several ways in which the Committee propose to keep his memory green. The fulfilment of these undertakings will have to depend naturally upon the active support given to the Committee by all those who had promised their support, and we are sure this will be forthcoming in an ample measure.

Mr. Wood was the first President of the Union and during his long stay in Coimbatore as the Principal and Ex-officio President, he did a lot in helping the Union to further its activities. We take this opportunity to make an earnest appeal on behalf of the Memorial Committee to all Mr. Wood's students, colleagues and friends in the Department to come forward with liberal donations so that the Committee may accomplish its desires without any further delay.



P. echinurus. *P. typhoides.*

BRISTLED CUMBU (PEARL MILLET)

BY G. N. RANGASWAMI AYYANGAR, B.A., I.A.S.,
&
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The earhead of *cumbu*, the pearl millet (*Pennisetum typhoides*, Stapf and Hubbard) is composed of a number of fascicles seriately disposed along a central rachis. Surrounding the spikelets in each fascicle is a whorl of 30—70 (average 40) free bristles. One of these bristles is thicker and longer than the rest and is called the "principal" bristle.[1] The morphological nature of this principal bristle has been discussed elsewhere and set down as the prolongation of the fascicle axis.[2]

The earhead of the commonly cultivated *cumbu* has a smooth surface and can be called bristle-less, the principal bristle keeping down to the grain surface. In *P. leonis*, a form of this millet from Sierra Leone, the bristle is even below the grain surface, so that the grains touch each other so closely as to give a very packed earhead.[3] A third condition is met with in a few varieties which are noticeably bristled. (Vide illus.) Bristled *cumbu* is much in demand for the reputation that it has for keeping off birds from pecking the grain. Bristled varieties are not very common in South India though in odd places in and outside this presidency there exist bristled forms.

To study the inheritance of this bristled condition, some bristled varieties were got down. Of these *P. echinurus*, an African species is "very bristly".[4] Its bristles measure on an average 2 cm. beyond the grain surface. Its chief disability is the tendency to shed spikelet whorls and this weakness might have militated against the perpetuation of very bristly types as economic varieties. That the reduction in bristles, both in number and in length, has kept pace generally with the packing of the grains on the earheads will be obvious from *P. leonis* which has the densest ear and the shortest bristles. Counts of fascicles and grains on a 2 inch length, an inch above the base of the earhead, of similar sized earheads (5 in each) have given on an average 943 fascicles and 1,521 grains for *P. leonis* and 502 fascicles and 1,028 grains for *P. echinurus*. It looks as if the spike-like disposition of the fascicles and the accommodation of both the grains and the obtrusive bristle brush on them, cannot go together with advantage.

These two species represent extremes in the length of the principal bristle and are constant in their expression. In order to get some idea of the genetic relationship of these two classes of bristles, "suppressed" and "very bristly", crosses were made between *P. leonis* and

P. echinurus and the F_1 was very bristly. In the F_2 there was a segregation for bristles, visible and suppressed. The lengths of the visible bristles ranged from short to medium and on to "very bristly". The groups ran one into the other so much that a sharp separation was not possible. All the visible bristles were, therefore, grouped together. The segregations obtained are presented below.

Cross No.	F_2 Family Nos.	Segregation for bristles Visible.	Suppressed.
P. T. VI.	P. T. 604	82	30
	,, 607	107	35
	,, 608	108	35
	,, 609	105	33
	,, 610	98	28
	,, 612	124	31
P. T. IX.	,, 616	78	25
	,, 619	100	29
	,, 620	44	16
	Total	846	262
	Expected 3 : 1	831	277
		$X^2 = 1{\cdot}08$	$P > {\cdot}05$

Though difficult of sharp classification through definite counts the bristled group could be broadly classified into full, medium and short. The average number of fascicles and grains in a 2 inch length in four typical earheads in each class of bristle length at corresponding portions, is given below.

Earheads with			Number of Fascicles.	Grains.
Full bristle.	...	...	731	617
Medium bristle.	...	,,	895	1231
Short bristle.	...	...	981	1419
Suppressed bristle.	...	...	1156	1702

The above figures show that with the reduction in the bristle length the earheads get denser in fascicles and grains until in the heads with suppressed bristle they are at a maximum. The reduction in the number of grains per fascicle in the full bristle group is very significant.

In the collections of *cumbu* at the Millets Breeding Station there were some from Bellary (*P. typhoides*, Stapf and Hubbard) that had small bristles. These occurred in a population in which the bristles were suppressed. The slight bristled heads bread true and had non-shedding fascicles. Counts were taken in 2 inch lengths at similar positions in both the groups of earheads and the following average numbers of fascicles and grains were obtained.

Bellary *Sajja* (*Cumbu*).

	Suppressed bristled.	Slightly bristled (0·5 – 1·0 cm.)
Number of fascicles	567	435
Number of grains	1189	828

It will be seen that though there is no shedding with the shortening of the bristle, the obtrusive bristles have affected grain density in the earheads.

P. echinurus is said to be "bird-resistant, the bristles pricking the eyes of birds which attempt to extract the seed from the heads";[4] and this has been the experience with this millet at the Millets Breeding Station, Coimbatore. Its chronic shedding, the long thick bristle and the associated vigour of the other minor bristles of the whorl and the consequent reduction in the number of grains (which is the all important end in view) militate against its spread as a cultivated variety, however desirable and helpful, the long bristle may be. It is, therefore, not surprising that through the selective forces of man exercised in the course of centuries the very short and suppressed-bristled and denser headed forms have formed the predominant group among the cultivated *Pennisetums*. Breeding to avoid the scaring of birds is thus beset with other economic disabilities.

Summary. Bristled earheads of *cumbu* help in preventing birds from pecking the grain. In the varieties studied, the longer the bristle, the greater the shedding of the fascicles and the lesser the density in the packing of the grain. The condition in which the bristles are suppressed in expression and remain below the grain surface is recessive to that in which the earheads show bristles of lengths from short to full.

References.

1. Arber, A. (1931). *Ann. Bot.* 45, 401.
2. Rangaswami Ayyangar, G. N. et. al. (1935). *Ind. J. Agric. Sci.* 5, 638.
3. do. and P. V. Hariharan. (1935). *Mad. Agric. Jour.* 23, 418.
4. Fl. Trop. Afr. IX–6. 1043.

CATTLE IMPROVEMENT IN COIMBATORE DISTRICT

By D. G. MUNRO, B. Sc.

One of the quickest methods of improving cattle is to arrange for the supply of a sufficient number of high class bulls. These mated with good cows will further improve the stock and when mated to cows of poor quality and mixed parentage will grade up the stock considerably in a few generations. The improvement of stock is a long term process and consequently calls for well-laid plans which will be continued over a period of at least 15—20 years.

The problem of bull supply resolves itself into three major parts. Firstly, the supply of bulls, secondly the cost of purchase of bulls and their distribution and thirdly the maintenance of the bulls during the years when they are at stud.

Supply of Bulls. Coimbatore district is fortunate in that it possesses a suitable and hardy breed of cattle—Kangayam—and a master in the art of breeding in the Pattagar of Palayakottai.

There is therefore a nucleus bull supply of at least 100—200 per annum, but is this sufficient? In Coimbatore and Salem districts alone, there are nearly 1,000,000 breeding cows. At 100 cows per bull, 10,000 bulls are required for these two districts alone mostly Kangayam and partly Mysore breed. On this basis, no further arguments need be given for the necessity to increase the supply of high class stud bulls.

Purchase of Bulls. The business of producing and rearing high class stud bulls is a costly one. All cows do not give the same quality calves and only the best of the bull calves in a herd are kept for stud bulls. The remainder are castrated for work bullocks. It has been argued that as good cart bulls can be purchased for Rs. 150—Rs. 300 per pair, stud bulls should not cost Rs. 150 to Rs. 300 each. Every man however expects the best price for the best animal and as the stud bulls are the pick of the season's calves, they should naturally be higher priced. If a bull performs 50 services per annum for 3 years = 150 services, let us take 120 calves as the result. A good bull will easily increase the value of each calf by Rs. 5 to Rs. 15 or an average of Rs. 10. The resulting increase in livestock wealth on this calculation is Rs. 1200 or 4 times the value of a Rs. 300 purchase price. The bull is still fit for further service or he may be castrated and used as a work animal. In evaluating a stud bull therefore, it should be borne in mind that not only is the animal itself being purchased, but also the increased value of the calves produced by it and a normally Rs. 300 bull is in the long run cheaper than a Rs. 100 bull.

Maintenance. The cost of maintaining a bull for a year varies with the locality. Where all fodder and concentrated foods are purchased in the market and a special attendant paid for, the cost is very high. Where the bull is maintained by a ryot producing his own fodder and his cattle attendant gives part time attention to the breeding bull, the cost may go down to Rs. 10 to Rs. 12 per mensem. When the District Board, Coimbatore paid maintenance charges, the cost went as high as Rs. 22—8—0 per mensem or Rs. 270 per annum, roughly the value of the bull himself.

Service fees are charged at rates varying from annas four to rupee one and considerable difficulty has been met in persuading ryots that any service fee at all should be paid. This presumably is the result of the Brahmini bull free service scheme in existence in former days. Bull schemes organised on more materialistic lines however demand that those who receive the benefit i. e., the ryots whose cows produce better calves, should contribute to the cost of maintenance and the most equitable manner of distributing such costs is by the levy of a service fee. If a bull does 50 services and the cost of maintenance is Rs. 150 per annum, to meet the maintenance charges alone, Rs. 3 as service fee is required. In Mysore in the Hallikar breeding tracts, a service fee of Rs. 2 to Rs. 5 is willingly paid by the ryots.

Government and District Board Schemes. About 10 years ago, the Agricultural Department introduced the premium scheme for breeding bulls whereby for a stated number of services a premium of Rs. 100 each would be paid annually towards the cost of maintenance of the bulls. 3 bulls were started in 1928 with Co-operative societies. Leaflet No. 2 of the Department of Agriculture gives information in regard to this scheme. The District Board also purchased some bulls and put them out with individuals and paid maintenance charges. An examination of the results in 1933—34 led to the conclusion that instead of paying maintenance charges or premia, it would be advisable to spend the money available annually in the purchase of bulls. These bulls are placed out with land-lords and ryots, who undertake to maintain them at their own cost as breeding bulls for 2 years and do 50—60 services per annum. At the end of two years, the animals then become their own property. The bulls are inspected and reported on quarterly by members of the Agricultural and Veterinary Departments and any defects in the bulls or their manner of maintenance are reported. The main difference between these schemes is that in one case the subsidy is paid as a premium towards maintenance charges and in the other case, the available money is spent in the purchase of bulls. One great advantage of this latter method is that at the time of purchase the bulls are selected by experts and a high standard of quality is ensured. The scheme is working satisfactorily and no difficulty is now found in getting men to take the responsibility in regard to their maintenance and carry out the necessary conditions. There are now 45 bulls (1935—36 = 22 and 1936—37 = 23), included in this scheme and 19 bulls under the Government premium scheme, 7 of which are maintained by Co-operative societies and the remainder by private individuals.

When propaganda was first started in regard to the necessity for breeding bulls, many arguments were put forward by the ryots against it. Now however, there is no argument as to the value of good bulls and more attention is being given to ways and means of raising the money to purchase and maintain them. The results are now obvious.

What of the Future? Cattle power today has more competitors than in the past. Railways and Motor lorries are becoming greater competitors for goods transport. Engines and electric motors with pumps are replacing mhotes for water lifting from wells. Therefore with greater competition cattle, if they are to hold their own, must become more efficient and no inefficient and poor cattle should be produced or reared at all. The supply of good breeding bulls must therefore be increased and the work intensified. As already pointed out long term schemes are required and if large subsidies from Government and Local bodies cannot be given, the cattle industry itself will have to bear the increased cost by paying larger service fees.

Milk Production. Up to the present we have dealt mostly with work cattle. The necessity for improvement of cattle for milk production cannot be overlooked. The Coimbatore District Board has already accepted a scheme for placing at stud Scindhe and Delhi buffalo bulls.

With increased industrialisation in large centres like Coimbatore, a larger number of people will cease to have any connection with the land. Nutrition experts point to millk as one of the most essential and perfect foods. The first stage in increased milk supply is the breeding of stock which will produce more milk. The question arises as to where such bulls should be stationed. Some say in the larger towns, others in the villages. Possibly at the present time, there are more milk cows in the larger towns than in the districts and to serve these cows the bulls should be placed there. But what about the calves? In towns they certainly do not get the attention or food required. It is also probable that as the Health authorities become stricter, the number of cows maintained in the larger towns will be decreased on the score of health and cleanliness. In the near future therefore, it is likely that the villages in the neighbourhood of large towns will become the dairy industry and dairy stock breeding centres and milk and milk products only will be transported to the large centres.

The displacement of work cattle by power for lifting water etc., will make room for milk cattle and these will produce the essential Farm yard manure to maintain soil fertility and at the same time pay for themselves by production of milk.

INHERITANCE OF GRAIN SHATTERING IN RICE (Oryza sativa).

By K. RAMIAH & K. HANUMANTHA RAO

Introduction. Shedding or shattering of grain is an important economic character in rice. In cultivated rices this causes a serious loss during harvest and the loss is estimated to vary according to the locality and the varieties, from as low a figure as 5% up to 30%. The firmness with which the ripe grain is attached to the rachis varies widely in different varieties. Wild rices exhibit this character to the maximum extent, the grains here falling away at the slightest impact of wind, even before they are fully ripe. In certain provinces where the cultivated rices get hybridised with wild rices through natural agencies the problem of shedding becomes a serious one. Some of the progenies of these crosses look for all practical purposes like the cultivated types but have the badly shattering character of the wild rice in them. Since it is not usually possible to identify them and eliminate them in the early stages, they form a permanent source of

deterioration of the crop. Bhalerao (1930) surveyed Mallnad tract of the Southern Division in the Bombay Presidency and has suggested remedial measures against these 'Gonags' or cultivated rices showing this wild character.

Among the cultivated rices, in some, the grains fall off very easily in the field itself during harvesting operations, while in others, like some of the Burma types in our varietal collection, the grains are so firmly attached to the rachis that threshing becomes a difficult operation. The ideal variety of rice should be one that does not usually shatter in the ordinary process of harvesting but at the same time lends itself to easy threshing. The study of the inheritance of this economic character was taken up at the Paddy Breeding Station in the years 1932—34.

Literature. The inheritance of this character where both the parents belonged to the cultivated types has not been reported so far. But when one of the parents is a wild type, it has been found (unpublished records of the Paddy Breeding Station) that this behaves as a simple mendelian character, the shattering being a recessive rudiment.

In his anatomical studies, Yoshito (1928) has shown that shedding is due to the formation of a special abscission tissue in the part of the stalklet which lies between the empty and the glume rudiment. The time at which this tissue is formed varies with varieties. In some this tissue is formed very early and dries up before the panicle ripens and this premature drying up causes the grain to shed before the harvest. In others, this tissue begins to form long after they have flowered, and the crop is harvested even before this tissue gets fully developed. The time of formation of this abscission layer thus determines the nature of shedding.

Estimation of shedding character. (a) *Device.* The estimation of the degree of shedding, a quantitative character, is not quite easy. The only recorded attempt to measure this character quantitatively is that reported by Mendiola (1926). The principle of this method consists in dropping the rice panicle from a definite height over a wire mesh, the degree of shedding being measured by the number of grains shed from such an impact. The method of dropping involves difficulties in controlling the way in which the panicle falls, as the surface of impact of the panicle cannot always be the same.

The study of a number of families for the inheritance of this character led to the improvisation of a simple apparatus designed by the Junior Author (1935) and it has been found to give satisfactory results. The apparatus consists of an inclined plane over which the panicle to be tested for shattering is placed at a definite distance from the top edge and a weighted roller which is allowed to pass over the head. The number of grains shattered by the roller passing over the panicle is a measure of the shattering.

(*b*) *Materials and Method.* A preliminary rough examination of all the pure lines grown at the Paddy Breeding Station, was made to distinguish the shedding and non-shedding types. When the degree of shedding is expressed as a percentage of the shed to the total number of grains in a panicle, the number of grains shed and the total number of grains on the panicle have to be counted each time which involves considerable amount of labour. The only method of eliminating this difficulty was to select such parents for crosses which though they varied with regard to shattering, had about the same size and number of grains in the panicle. In the study of the families involving parents having such uniform panicles, the actual number of grains that shed was taken as an index of the measure of the degree of shedding.

The next step was to decide the minimum number of plants and the minimum number of ear heads in each plant that would have to be examined which would give a correct estimate of the whole family for the character. After some preliminary tests it was found that the shattering measured in one of the main panicles in each of 25 plants in a family gave a correct estimate of the character of the family.

There is also another difficulty which should bring in an error in the estimation namely that due to the degree of ripeness of the grain. Obviously for the measure of the character, panicles of the same age have to be examined. Since ripening depends upon the time of flowering the flowering dates of each plant were recorded in each of the families and the panicles were collected exactly 40 days after flowering, when the grains were found to be ripe.

The procedure adopted for the estimation of this character was as follows. The first thing was to mark the detailed flowering of the individual plants on a chart. By referring to this chart, plants, that flowered 40 days earlier were spotted out in the field. One primary earhead from each of those marked out plants was cut just below the neck or the ring of the panicle, early in the morning. All the earheads were carefully labelled and were uniformly dried in a tray for four hours. They were then placed over the apparatus one by one and the roller was passed. The number of grains shattered in each panicle was taken as the measure of the degree of shattering.

Inheritance Studies. *Parents.* One of the parents selected was T. 237, a non-shedding type where the number of grains shed ranged from 0—10 with a mean of $3{\cdot}54 \pm 0{\cdot}13$. The other parent was T. 389, a highly shedding type where the grains shed ranged from 17—56 with a mean of $34{\cdot}30 \pm 0{\cdot}53$ grains.

F_1. A cross was made between the above two parents T. 237 xT. 389, in the year 1931—32, and in 1932—33 the F_1 plants were grown. Since the device mentioned had not been perfected when the F_1 was ready, the degree of shattering was estimated only by beating the head

Table I.

Frequency of number of grains shed in F_2 and parents. (1933—34).

	Number of grains shed.															Total.	Mean number of grains shed.
	Nil.	1-4	5-8	9-12	13-16	17-20	21-24	25-28	29-32	33-36	37-40	41-44	45-48	49-52	53-56		
Parent T. 237	4	66	24	1	—	—	—	—	—	—	—	—	—	—	--	95	3·54 ± 0·1302
F_2 4482	–	59	134	108	104	63	30	24	7	5	1	2	—	—	--	537	12·34 ± 0·2057
Parent T. 389	–	—	—	—	—	5	10	17	13	18	14	12	9	3	3	104	34·30 ± 0·5344

Table II.

Statement showing the correlation betweeen the number of grains shed in F_2 and the mean number of grain shed in F_3 progenies.

Mean number of grains shed in F_3 progenies.	Number of grains shed in F_2.																						Total
	1-2	3-4	5-6	7-8	9-10	11-12	13-14	15-16	17-18	19-20	21-22	23-24	25-26	27-28	29-30	31-32	33-34	35-36	37-38	39-40	41-42	
1—2			1																			1
3—4	1	10	8	12	6	2	2				1											42
5—6	11	16	20	15	13	13	11	6	4	4	...	2	1									116
7—8	6	11	16	21	14	9	14	17	7	4	2	...	2	2								125
9—10	1	3	10	9	15	13	13	9	12	5	5	4	4									103
11—12	...	2	2	3	6	5	6	6	9	3	5	1	3	3	1	1	1	1	...	...	1	59
13—14	...	...	2	...	2	...	1	3	4	7	1	2	4	...	1	1	...	...	...	1	...	29
15—16	...	...	...	2	...	...	1	5	...	2	...	1	1	...	2	1	...	...	...	...	1	16
17—18	...	...	...	2	...	...	1	...	...	...	3	...	1									7
19—20	...	...	...	...	1	1	...	...	...	1	...	2	2	...	...	...	...	1				8
21—22																		1				1
23—24																						...
25—26																						1
27—28																						1
Total.	19	42	59	64	57	43	49	47	37	26	17	12	18	5	4	3	1	3	...	1	2	509

		F_2	F_3
Parental means.	T. 237	3·5	2·9
	T. 389	34·3	25·0

Correlation r = + 0·48 ± 0·023.

on the palm and it was found to be intermediate between the two parents.

F_2. In 1933—34 all the seeds from one of the selfed F_1 plants were sown, and 600 F_2 seedlings were planted in lines one foot either way. 150 plants of each of the two parents were also planted in lines on either side of the F_2 population. Detailed flowering was marked for all the plants individually. Shedding was estimated as described already. The results obtained are given in a tabular statement (Table I).

F_3. In 1934—35, the whole F_2 population was carried forward for the study of F_3 behaviour. In each lot, 100 plants were planted in three rows 1′ apart and 6″ in the row. Here also general flowering was marked for individual families and the estimation of shedding was done with reference to those dates. 25 plants were examined in each family.

From the readings collected, first the mean number of grains shed in the F_3 families, the standard error and the percentage standard error were calculated. The coefficient of correlation between the number of grains shed in F_2 and the mean number of grains shed in the respective F_3 families was determined (Table 2).

Analysis and Conclusion. F_2 ratios do not indicate any simple inheritance. The mean number of grains shed per panicle for the two parents are 3·54 and 34·3 respectively whereas the F_2 mean is 12·34, intermediate and tending towards the nonshedding parent. The greater variability and the distribution of the F_2 population indicate that more than one factor is involved in the inheritance of this character.

In the F_3 we find that there is a significant positive correlation between the number of grains shed in F_2 and the mean number of grains shed in F_3, the coefficient of correlation, r, being $+0{\cdot}48 \pm 0{\cdot}023$. This is an indication that the factors involved in the inheritance of this character are not many.

Reference.

Bhalerao S. G. (1930). Grain shedding character in Rice and its importance. *Imp. Ins. Agrl. Res. Pusa.* Bull. No. 205.

Copeland E. B. (1924). Rice. Page 121.

Hanumantha Rao K. (1935). A simple device for the estimation of shedding in Rice. *Mad. Agri. Jour.* Vol. 23, page 77.

Mendiola N. B. (1926). A manual of plant breeding for the tropics, page 75.

Yoshito Yamasaki (1928). Studies on the abscission of the spikelet in Oryza sativa. *Jap. Jour. of Bot.* Vol. 4, Abs. 354.

GINGER CULTIVATION IN AND AROUND KALUVOY

BY A. VENKATARANGAM,
Agricultural Demonstrator.

Cultivation of ginger is to be seen round about Kaluvoy village of Atmakur Taluk; but is not extending further; the soils and the undulatory nature of the land here are said to contribute to the successful cultivation of ginger. The crop does not seem to come up well on mere plains. It requires *Kondachaluva nela* as they put it—i.e., hill-side villages with rich loams having good drainage facilities and water supply for 10 months in the year.

Preparatory Cultivation. The land is ploughed 10 to 12 times to get good tilth; ridges are then formed lengthwise 14 inches apart. The field is next divided into beds of uniform size of 4 yards × 18 yards for forming irrigation channels lengthwise and breadthwise. Thus each bed will have about 10 ridges 18 yards in length. This is the usual method adopted; but there will be variations seen in the size of beds depending on the contours of the field.

Planting. Planting is generally done in May or beginning of June. Ginger removed fresh from the field is not used for seed-purposes; but is allowed to wither for a month or two in shade. During this period it is kept in heaps which are disturbed now and then; one or two days before planting, this seed ginger is cut into pieces having two or three internodes.

At first a mixture of *agathi* (*Agathi grandiflora*) and greengram (*Phaseolus mungo*) seeds are dibbled at the top of the ridges with 12 inches spacing, the seed rate of agathi and green-gram being 20 and 14 lbs. respectively per acre. Water is then let in and the space between the ridges is flooded. Next day when soil gets into the right condition, (i.e., without getting sticky) ginger is planted on one side of the ridges in a line with the points, where agathi and green gram seeds are dibbled and also on one side of the irrigation channels with the same spacing; The seed rate for a ginger crop is 40 to 50 maunds per acre. After planting is over, manuring is done, generally on the same day, by top dressing with about 50 cartloads of cattle manure or sheep manure or mixture of both per acre. The sowing of agathi and green-gram is to give enough shade to the tender ginger crop, which takes about one month for complete germination; by this time agathi and green-gram grow sufficiently thick to give the requisite shade. Depending on weather conditions irrigation is generally given once in a week until the crop matures.

After-Cultivation. Hand weeding is commenced generally 10 days after planting and is done frequently until the crop is about 4 months old, by which time the crop covers the ground and there is no necessity for hand weeding.

After one month, the green-gram is pulled out and fed to cattle, as *agathi* alone would do well to give the required shade to ginger crop. After two months, thinning and topping are done in agathi lines to regulate the shade ; by frequent toppings, agathi plants are not allowed to grow more than a man's height. Just at the time when the thinning of agathi plants is begun, " *Thangedu leaf* " (*Cassia auriculata*) is brought in sufficient quantities and spread between the lines of agathi and ginger plants. After these leaves are dried up, the *thangedu* stalks are removed and the dried leaves are worked into the soil by hand hoeing and earthing up between the lines.

Harvesting. After ten months i. e., about the month of March, the crop can be removed, the maturity of the crop being noticed by the drying of the leaves. The crop is to be removed soon after the leaves are dried (i. e., in about 15 or 20 days); otherwise the rhyzomes become unfit for seed purposes, as they begin to germinate again. If it is allowed to germinate again (as is done actually in some places) it has to be kept for six months more i. e., till the month of October, when the yield will be nearly doubled. The yield of 10 months crop is about 400 maunds of green ginger or 10,000 lbs. per acre ; while the yield of 16 months crop is about 19,000 lbs. of green ginger per acre.

The local merchants purchase the produce at about Rs. 2 per maund and export the green stuff, as it is, to Northern Circars ; but no curing is done here nor is it known in these parts.

The gross income for the grower from a short term crop, i.e., 10 months crop is about Rs. 800; while that of a long term crop is about Rs. 1500 per acre in all normal years. The cost of cultivation for 10 months crop, as given below, shows a total expenditure of Rs. 250 per acre, including cost of seed and manure thereby giving a net income of Rs. 550 per acre ; while in the case of 16 months crop the net profits are expected to be about Rs. 1150 for in this case, the grower has no other expenditure except keeping on the crop under well irrigation during summer, for which item a liberal sum of Rs. 100 has been allowed under cost of cultivation.

General. The Rhyzomes of long term crop are said to be unfit for seed purposes. Ginger is also cultivated in Kothur village on Cuddapah borders in Rajampet taluk and the produce there is said to be the best for seed purposes. Hence the growers at Kaluvoy renew the seed once in 3 or 4 years with fresh supplies from Kothur a distance of 15 miles from Kaluvoy.

Cost of cultivation of short term crop of Gingelly per acre.

Preparatory cultivation.				
Ploughing 12 times—24 pairs at Re. 1/- per pair. ...	24	0	0	
Forming ridges—one pair at „ „ ...	1	0	0	
Forming beds and irrigation channels—2 men at 6 annas per head	0	12	0	
				25 12 0

Manures and manuring.						
50 cartloads of cattle manure at Re. 1/- per cartload ...	50	0	0			
Spreading the above—6 men at 6 as. per head. ...	2	4	0			
				52	4	0
Seeds and sowing.						
Dibbling agathi and greengram—2 men at 6 as. each ...	0	12	0			
Cost of 10 seers of agathi and at 10 seers per rupee. ...	1	0	0			
Cost of green-gram 6 seers at 12 seers per rupee. ...	0	8	0			
Cutting ginger and planting—6 men at 6 as. per head. ...	2	4	0			
Cost of ginger seed 50 maunds at Rs. 2/- per maund. ...	100	0	0			
				104	8	0
After-cultivation.						
8 weedings including thinnings	10	0	0			
Cost of 20 headloads of "Thangedu" at 2 as. per headload.	2	8	0			
				12	8	0
Irrigation.						
Tank irrigation supplemented with well irrigation during summer (8 well-irrigations at Rs. 3/- per irrigation). ...				24	0	0
Harvesting.						
Digging tubers at Rs. 15/- per acre.				15	0	0
Contingencies				16	12	0
Total Rs.				250	0	0

Research Notes.

A remarkable emergence of a Pempheres parasite.

An unexpected emergence of a large number of Braconid parasites (Spathius Sp.) from a cage of wilting cotton stalks under observation was discovered for the first time on 20th March 1936. This Braconid is already known to be a definite parasite of the larval stages of the cotton stem weevil—*Pempheres affinis*, *F*, and the same has been observed and collected from several places like Coimbatore, Ramnad district and Erode. The emergence continued for over a month and a half though irregularly and in diminishing numbers. About five hundred parasites have thus been collected.

It was strongly suspected at the time that an alternative host was involved in this mass emergence. But no satisfactory and conclusive evidence in regard to its true host relations was forthcoming at the time. As a result of careful studies and actual collection of the host stages and adults it is now definitely seen to be a specific parasite of a Bostrychid—Sinoxylon sudanicum Lesne.

P. N. Krishna Ayyar, *Parasitologist.*
P. S. Narayanaswami, *Assistant.*

Mendelian Segregations for Juiciness and Sweetness in Sorghum Stalks.

In a previous article* juiciness and sweetness in the stalks of sorghum have been reported to be independent, heritable characters. A number of segregations for these characters have been noted for each separately and in combination. A factor D is responsible for dry pithy stalks ; d produces juicy stalks. A factor X results in "not sweet" stalks ; x results in sweet stalks. D and X are independent in inheritance. The Mendelian segregations obtained are presented below :

* Rangaswami Ayyangar, G. N., Juiciness and Sweetness in Sorghum Stalks. *Madras Agricultural Journal* 23 (9) Pp. 350—352. 1935.

Table I.

Pure for Sweetness (xx), *Segregating for Juicy Stalks* (Dd).

	Stalk—Pithy DD and dd (Midrib—White)	Stalk—Juicy dd (Midrib—Dull)
Totals of 24 families grown in Nandyal, Hagari and Coimbatore.	1644	689

Table II.

Pure for Juicy Stalks (dd), *Segregating for Sweetness* (Xx).

	Stalk (Pure Dull Midrib)	
	Not Sweet (XX and Xx)	Sweet (xx)
Total of 12 families	1176	392

Table III.

Pure for Pithy Stalks (DD), *Segregating for Sweetness* (Xx).

	Stalk (Pure White Midrib)	
	Not Sweet (XX and Xx)	Sweet (xx)
Total of 5 families	545	206
Expected (3 : 1)	563	188

$X^2 = 2{\cdot}298$, $P > 0{\cdot}10$.

In crosses between a pithy stalked sweet variety and a juicy stalked "not sweet" variety the first generation was pithy stalked and "not sweet". The following di-hibrid segregations have been obtained.

Table IV.

Di-hybrid segregations for Pithy and Juicy stalks and for "Not Sweet" and Sweet.

	Stalk—Pithy (DD and Dd)		Stalk—Juicy (dd)	
	Not Sweet (XX and Xx)	Sweet (xx)	Not Sweet (XX and Xx)	Sweet (xx)
Total of 5 families	917	348	342	115

In further selections the economically poor combination of pithy stalks "not sweet" has been fixed and is breeding true.

Millets Breeding Station,
Coimbatore,
July 18, 1936.

G. N. Rangaswami Ayyangar.
M. A. Sankara Ayyar.
V. Panduranga Rao.
A. Kunhikoran Nambiar.

Correspondence.

To The Editor, Madras Agricultural Journal, Coimbatore.

Sir,

With reference to the letter of the Parasitologist, dated 11--6—'36, I have great pleasure in answering the points raised by him.

As the monthly reports of the Parasitologist are not published for the benefit of other entomological workers, I was unfortunately unaware of the items of "new knowledge" which he claims to have reported about, when I sent my note for publication to the Editor of the M. A. S. U.

To the claim of priority advanced by the Parasitologist based on his monthly report for December 1935, I take leave to give the following extract from my monthly report for December 1933:—"During the month, when the Cotton Specialist was camping here, I drew his attention to the fact that Pempheres was present here. Since then, I have noted adults on *Hibiscus esculentus* plants very constantly and the examination of a few available old plants gave evidence of heavy Pempheres infestation on the stems. I have not come across any infested cotton plants so far". This fact was observed even earlier by Mr. P. S Narayanaswamy, my predecessor at Taliparamba; though he has to my knowledge, not reported about this, I have with me Pempheres specimens collected by him from *H. esculentus* plants. I may also enlighten the Parasitologist that there was some correspondence on this subject between the Cotton Specialist and myself.

The joint paper quoted by the Parasitologist is a resume of the experiments and observations arrived at by the authors after the first two years of work at Coimbatore and was presented at the College Day and Conference in October 1933. The observations recorded in my note were made after my subsequent transfer to Taliparamba.

The inquiry of the Parasitologist to the Farm Manager, Taliparamba, was whether he could see the plants which he had listed in the farm. When the Farm Manager consulted me about this I informed him that I was not aware of the availability of these plants either inside the Farm or near-about. The Farm Manager's reply must have been a natural corollary of this information, since he could not expect a pest to be present in the absence of the host plants.

I am extremely pained to note the general trend of the remarks of the Parasitologist which, to qualify even mildly, is unhealthy.

Agricultural Research Station,
Taliparamba, 2—7—'36

E. R. Gopala Menon,
Entomology Asst.

To The Editor, Madras Agricultural Journal, Lawley Road P. O.

Sir.

I think a word or two might be said about the host plants of *Pempheres affinis* other than cotton. As early as 1909 Lefroy, in his Indian Insect Life, (page 389) says that the weevil is common in the stems of malvaceous plants, attacking cotton severely but he does not specify the names of these other malvaceous plants. In the Proceedings of the 2nd Entomological Meeting, Pusa, 1917, (page 125), Fletcher mentions that Pempheres occurs in bhendi plants (Hibiscus esculentus) at Pusa and is probably widely distributed but overlooked. Dr. Ramakrishna Ayyar has mentioned the occurrence of the weevil in bhendi in the Madras Year Book (1918) and the Proceedings of the 3rd Entomological Meeting, Pusa, (1919). Ballard in his paper on "Further notes on Pempheres affinis, Fst. the cotton stem weevil" published in Vol. VII No. 12 of the Pusa Memoirs (1923) states the weevil has been bred from Hibiscus esculentus and other malvaceous plants. Since then Dr. Ramakrishna Ayyar has expressed doubts as to the correctness of Mr. Ballard's statement for, as late as October 1934 he states "I do not believe that the weevil has been found to breed on any other plant than cotton.' I would therefore welcome Mr. Gopala Menon's statement that he has bred the weevil from *Hibiscus esculentus* as it re-establishes the correctness of the original observations.

I would also like to bring to the notice of your readers another point. To me, Mr. Menon's main idea in publishing his observations seems to be to emphasize the fact that Pempheres though found in bhendi was absent from the

varieties of cotton grown in the farm. Perhaps, a detailed study of this problem may help to trace the original host plant of Pempheres.

Regarding the two points raised by Mr. Krishna Ayyar (non-inclusion of bhendi as an host plant in the joint paper and the Farm Manager's reply) and Mr. Gopala Menon's reply I leave it to the readers of your valuable journal to judge these on their own merits.

M. C. Cherian,
Government Entomologist.
13-7-'36

STOCK REARING IN THE TROPICS

Management of Cows. All cows are dried off six weeks before calving, or earlier, if their milk yield drops below 25 lb. When a cow is dried off, she may be given a dose of 1 lb. magnesium sulphate, though usually this is not necessary. She is then drafted into the dry cow herd, where she remains on dry cow rations until a month before she is due to clave. She then returns to the milking herd, and comes into the milking shed twice daily, along with the milking cows, and receives milking cow rations on the basis of a yield of two gallons. If she has had a calf before, she requires no further attention before calving, but if she is a calving heifer, or a known heavy milker, she has her udder washed and massaged twice daily, and is lightly milked for a week before calving. Such ante-natal milking should, however, be done very gently and care should be taken to avoid causing pain and consequent apprehension.

A good deal of importance has recently been attached to this question of pre-natal treatment at Pusa, where experience with the Sanhiwal herd has indicated not only a considerable increase in milk yield, but also a remarkable freedom from udder trouble. It is claimed, as an additional advantage, that this treatment makes the cow much more amenable to letting down her milk without the calf. It is not considered at Shika that at present this question is one of much importance. All that is wanted is to secure that the mammary glands are stimulated sufficiently to start secreting fully and immediately the cow calves. It would be most beneficial no doubt, in the event of any congestion of milk, sufficiently great to be likely to cause udder trouble, but this is of extremely rare occurrence with native cows. It is not considered therefore that the practice is worth the amount of extra work involved. By keeping a calving list, prepared month by month, some time ahead, it is possible to ensure that all heifers due to calve come up for observation in due course.

One week before an animal is due to calve, she is transferred into the calving pen. This should be kept very clean, the walls whitewashed after each calving and soiled litter removed daily. During this week the cow is given an extra supply of *dusa* * to keep her bowels free, and if there is any sign of constipation, she should be given ¾ bottle of linseed oil.

At birth the calf's cord is not ligatured but is cut off, washed with a lysol solution and painted with iodine. Previous experience with tying the cord has been unfortunate. The afterbirth should come away of its own accord within 24 hours, but no action need be taken up to 48 hours. If at the end of this time it is still adhering, it has been found of assistance to twist the end of the afterbirth round a piece of stick and by twisting, exert slight pressure. This twisting should be increased hourly or a small weight attached, and in nearly every case the afterbirth will come away by itself. On no account should attempts be made to hasten its exit by hand, as it is most likely that inflammation will

* Bran of guinea corn (Andropogon sorghum).

ensure, and the cow almost certainly become barren, while there is a considerable risk of the operator getting an unpleasant skin infection.

Up to a few months ago, it was the custom to leave the calf with its mother for two days and two nights and not start milking proper until the third day. (Every cow, of course, is milked a little immediately she calves, in order to ensure a free flow for her calf). This practice has been criticised on the ground that it leads to the holding up of milk and reacts adversely upon the cow's ultimate yield. On the other hand, it is held by some that by removing the calf from the mother at birth, its health was being prejudiced, by its being deprived of its natural self-prescribed ration of *colastrum*. However, the length of the suckling period has been gradually reduced, without apparent harm to the offspring, and at the time of writing, all calves are removed from their dams at birth. Instead of *colostrum* the calf gets a laxative on the first three days of its life: on the first day one tea-spoon of linseed oil, on the second day the same plus one tea-spoon of castor oil; on the third day the castor oil is increased to three tea-spoonfuls. This amount of laxative seems to get rid of the *meconium* fairly well, and since the wellfare of the calves is the major concern at Shika, the new routine is firmly established.

When the cow calves she continues to receive rations at the rate proportional to a two-gallon yield. In actual practice, she is fed *ad lib* for some four weeks after calving, or until such time as she has definitely passed the crest of her flow. One's aim should of course be to reach that maximum as quickly, and to maintain it as long as possible. This can only be done by giving every newly-calved cow individual attention, and by breaking down any tendency on her part to hold up her milk by milking her frequently. With calving heifers, it is often necessary to milk up to ten times a day, before one can be certain that no milk is being withheld, and *all* cows are milked at least five times daily for the first three weeks of their lactation period. In spite of all care, blind quarters are occasionally found, and experience here is that it is better to get rid of such animals at once, as treatment is nearly always unsatisfactory. It is difficult, if not impossible to cure, and there is no known formula for making the necessary correction in the record of the cow's milk yield. Care is taken to see that as soon as a cow's milk yield drops, her ration are proportionately reduced, as otherwise she is simply putting on unnecessary fat.

Calf Rearing. When the calf is taken away from its mother it is put into an individual calf-pen and well bedded down. Each pen has a ticket showing weight at birth, and weekly increase of weight. The calf remains in these pens for one month or until it has to make room for a new arrival. During that period it receives its mother's milk at least three times per day. If the cow will let down her milk without her calf so much the better and this is a tendency which is very strongly encouraged. Roughly, the following quantities of milk are fed to calves:—

Birth to one month	...	5 lb. per day.
1—2 months	...	6 ,,
3—4 ,,	...	8 ,,
5—7 ,,	...	10 ,,

These quantities vary with individual cases, and it is better during the first month of a calf's life to err on the light side, as a calf's stomach is unable to cope with large quantities of milk. The milk after being drawn from the cow is heated up to blood-heat before being fed. All calves have free access to bran from birth and although they seldom touch it during the first two weeks, it is advisable to have it there. The total amount of milk fed to a calf is about 175 gallons.

From the individual pens the calves are moved into a pen at the side of the milking shed, holding from four to six animals each. As soon as an individual pen is vacated the floor is washed out with a disinfectant solution, and the walls re-whitewashed before a new tenant enters. At one time the calves that had to go into the milking shed to induce their dams to let down milk, were segregated from those that never entered it, but this is no longer done. From these pens the animals move into one or other of three pens where they are graded according to size and age, a fourth pen is reserved for convalescent cases while they are segregated from their fellows. Good housing in the dry weather, when the diurnal variation of temperature is great, and the early hours of the morning quite cold, plays an important part in keeping the calves healthy.

The calves are drafted from this last series of pens when they reach eight months old, and here the first segregation of sexes occurs. Calves have in the autumn been drafted straight into the feeding experiment, but during the spring and summer months, the sexes are penned separately. The females are taken into the Dry Season Feeding Experiments, while the males out of inferior dams are castrated.

As soon as heifers are served they go into the "calving heifers" herd where they get special feeding as laid down in the table of rations.

In the early autumn (September) the castrated males are handed over to "mixed" farmers through the Superintendent of Agriculture concerned.

Before a calf is one month old it should be drenched once with turpentine and linseed oil against roundworms (6 ozs. turpentine in 20 ozs. linseed).

After it is one month old it should be drenched against wireworms with copper sulphate and mustard at fortnightly intervals, at rates varying with weights. Drenching with copper sulphate and mustard every fortnight is routine for calves, sheep and goats throughout the wet season and up to the end of November. It is considered worth while drenching at 4-30 a. m. or earlier in order to give the drug a fair chance of acting before the morning milking.

The dangerous time of a calf's life is from birth till six weeks old. During that time they must be watched most carefully. The first sign of anything wrong is usually diarrhoea. When this occurs the animal should be put straight into the "hospital", dosed with castor oil, and not given any milk for 12 hours. If at the end of that time there are signs that the scour is lessening, small quantities of milk and hot water (50/50) may be fed at intervals of three hours, but the animal should not be put back on its full rations too soon In some cases this treatment will cure in a day or so, but unfortunately in the majority of cases, convalescence is a very long business entailing constant supervision. Many different measures have been tried, with varying success, but prevention is better than cure, and the secret of successful calf-rearing is considered at Shika to be cleanliness, cement floors, and absence of overcrowding until the calves are over two months old. Towards this end, it is essential, among other things, to see that all calves have clean litter, that the udder of each cow is properly washed before she is milked, that the calf's mouth is washed and dried after it has had its drink (this lessens the attacks of flies and reduces the loss of hair round the mouth), that milkers wash their hands frequently during milking time, and above all, that buckets should be well washed between individual milkings To avoid overcrowding, draft the biggest calves into the segregation pens as soon as possible.

External parasites (lice and fleas) need not be anticipated until the animal is two to three months old and is living on a floor of litter. A daily inspection of the animals should then be carried out and whenever lice are noticed, the stock should all be dipped with arsenic dip (1 in 250) in a small bath. At the same

time the bedding should be burned and walls re-whitewashed. Other dips have been tried such as emulsified soap and kerosene, tobacco and mustard, but Cooper's arsenic dip seems the most satisfactory. Care should be taken to see that young calves do not get chilled and therefore the dip should be slightly warmed, the animals should be dried afterwards, and the dipping should not be done very early in the morning

Feeding of Cows. The West African Zebu cow in the hands of the Fulani herdsman leads a nomadic life grazing from one part of the country to another, being forced by the drying-up of streams and water-holes to move southward as the severity of the dry season increases in the more desiccated north Poor as the natural grazing is known to be for eight months in the year, the Zebu cow exists on it alone and receives no concentrates. If she exhibits signs of 'pica', she may be given a littla native cattle 'lick', consisting of salts of soda and potash, but that is all. In these circumstances, reproduction entails a severe drain on her constitution and the loss in body-weight during her lactation period is appalling Among native owned herds, annual calving is exceptional, biennial and triennial calvers being the rule, and it seems fairly certain that this reluctance to breed regularly and often is an inhibition evolved by the animal through generations of privation, to combat the hard conditions in which she has her existence.

From investigations carried out among the Fulani, it seems accurate to state that the milk yield of their cows varies in inverse proportion to the periodicity of calving. One factor which practically by itself will upset this correlation, is the adequate feeding of balanced rations, and it has been proved at Shika that if this is seen to, the bulk of the cows will (and do) calve down regularly once a year.

The whole aim in fixing the rations of the breeding stock is therefore *so to maintain their condition that their milking performance is a true record of their capabilities.* This applies equally to young female stock as to mature cows, for if an animal's development is retarded at any period of its life prior to or during the time it is recorded, it not only affects its own record but masks the true value of its sire. All animals (except the working stock) are weighed at monthly intervals and an inspection of these weights enables one to see whether an animal is doing properly or not.

Feeding of Breeding Bulls and Working Bullocks. While a bull is running with a herd of cows, he is fed *ad lib*, regardless of season. This is to ensure that he keeps in good form, for if he allows a cow to come in season without serving her, then he is seriously affecting her record.

During the cropping season (April to August) all working beasts should be fed *ad lib.* They have to work very hard indeed, especially at the beginning of the season, and unless personal attention is given to their feeding they will be unable to stand up to their task. Their health must also be watched, and though fortunately at Shika, there has been very little serious sickness, apart from the usual sprains, cuts and abrasions that require no special mention, there is always the risk of trypanosomiasis. All likely breeding grounds are regularly cleaned and there is consequently no 'fly', but there is always the risk of mechanical transmission, in view of the fact that the majority of the animals here is purchased stock.

Liver flukes are however abundant, and a *post mortem* never fails to show this parasite or indications of its presence. All marshes and drinking pools are treated with copper sulphate (one part in a million) at three monthly intervals to kill the snail hosts. Animals that appear to be infected are treated with small doses of tartar emetic, only slightly more than half the doses generally recommended for animals suffering from trypanosomiasis. (From the *Tropical Agriculture.* Vol. XIII, No. 6 June 1936, pp. 151—153).

Crop and Trade Report.

Groundnut 1936—Summer and Early Crops. Sowings of the summer crop of groundnut and of the early crop in the districts of Salem and Coimbatore are generally satisfactory. Harvest of the summer crop of groundnut has commenced in parts.

The yield is expected to be generally normal. The wholesale price of groundnut (shelled) per imperial maund of 82 2/7 lbs. as reported from important market centres towards the close of June 1936 was Rs 6–1–0 in Cuddalore, Rs. 5—15—0 in Vizianagaram, Rs. 5—14—0 in Guntur, Rs 5—11—0 in Vellore, Rs. 5—10—0 in Negapatam. Rs. 5—9—0 in Cuddapah and Salem, Rs. 5—8—0 in Cocanada, Rs. 5—7—0 in Nandyal. Rs. 4—11—0 in Madura, Rs. 4—6—0 in Vizagapatam, Rs. 4—3—0 in Bezwada, Rs. 4—2—0 in Ellore and Rs. 3—6—0 in Tinnevelly. When compared with the prices in March 1936, these prices reveal a rise of 50 per cent. in Madura, 35 per cent. in Tinnevelly, 20 per cent. in Cuddapah, 15 per cent. in Nandyal, 14 per cent. in Ellore and Salem, 12 per cent. in Vellore. 10 per cent. in Guntur, 9 per cent. in Vizianagaram, 5 per cent. in Negapatam and 1 per cent. in Cocanada and Cuddalore and a fall of 20 per cent. in Vizagapatam.

College News & Notes.

The Students' Club. The general body meeting held on the 30th June 1936, elected the following office bearers for the working Committee of the Agricultural College Students' Club. Club Secretary, H. Krishnakumar. Games Secretary, S. K. Sastry. Cricket Captain. D. V. Rajagopalan. Hockey, V. Joseph dass. Foot ball, M. Mukundan. Tennis Representative, P. M. Sayeed. Class Representatives, III year, A. V. Pichumani. II Year, Agha Muhamad Bauker. I Year, Kunhirama Menon. On the 23rd the students of II year and III class gave a tea to welcome the 1st year and short course students. The members of the teaching staff, the tutors and the Secretary of the Union participated in the function. The representatives of the ii and iii year students made speeches welcoming the freshers and they were followed by the representatives of the tutors. members of the staff and the coaches, and the Secretary of the Union. The representative of the 1st year class replied in suitable terms. The Principal in a short speech emphasised the value of practical work in agriculture and advised the students not to neglect it.

Cross Country Race. The race was run on the 18th and S. V. Sastry was winner, Marthappakini II and Syinludian III.

Diamond Jubilee Celebrations. The various committees. formed in connexion with the College Day Celebrations are busy making arrangements for the unique event. The preliminary heats were run on Saturday the 25th inst. The sports will come off on the 1st. August. The Entertainment committee have on their programme four plays for the first night (30th) and one on the 31st. The Agricultural Officers of the iv. circle will enact a play dealing with Agricultural propaganda, written by Mr. S. Raja Ratnam.

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The Gazetted Officers of the Department will meet in a special conference on the 30th and 31st at which a large number of important topics are to be discussed.

Correction. Mr. N. Sivaraj did not visit Coimbatore in connection with the selection of students as mentioned in our last issue. The members who visited were—Rao Sahib S. N. Ponnai Kavundar, Chairman of Coimbatore Municipality.

Mahboob Ali Baig Sahib Bahadur, M.L.C., Bezwada. The other member M.R.Ry. N. Ranganathan Avl., M.L.C. could not attend. We regret the error.

Association of Economic Biologists An Ordinary Meeting of the Association was held on Friday, the 24th July at 5-30 P. M. in the Freeman Building when the following two papers were read and discussed (1) Some physiological observations on Groundnut by U. Narasinga Rao, B. Sc. Ag., and (2) Cytological Studies in Cymbopogon Species by C. N. Babu, B. Sc.

Visitors. Dr. S. K. Sen, Physiological Chemist, Institute of Science, Bangalore visited the Institute during the month.

Weather Review (JUNE 1936).

RAINFALL DATA

Division	Station	Actual for month	Departure from normal @	Total since January 1st	Division	Station	Actual for month	Departure from normal @	Total since January 1st
Circars	Gopalpore	14·7	+8·9	28·9	South	Negapatam	1·6	+0·3	10·4
	Berhampore *	11·3	+4·1	20·9		Aduthurai *	1·2	- 0·2	7·3
	Calingapatam	4·8	+0·1	11·1		Madura	0·8	- 0·6	9·2
	Vizagapatam	3 4	- 1·5	12·4		Pamban	0·0	- 0·1	5·4
	Anakapalli *	4·1	- 0·9	18·4		Koilpatti *	0·2	- 0·3	8·8
	Samalkota*	8·8	+4·7	20·6		Palamkottah	0·7	+0·2	12·0
	Maruteru *	8·0	+5·5	15·0					
	Cocanada	9·3	+4·5	17·6					
	Masulipatam	3·3	- 1·2	14·9	West Coast	Trivandrum	10·4	- 3·0	33·0
	Guntur*	2·9	- 0·7	17·8		Cochin	18·9	- 9·6	53·3
Ceded Dists.	Kurnool	3·8	+0·8	7·3		Calicut	33·3	- 0·8	59·9
	Nandyal *	6·2	+1·6	8·6		Pattambi *	23·1	+14·2	41·6
	Hagari *	1·4	- 0·2	5·8		Taliparamba *	33·3	·6·0	44·9
	Bellary	0·9	- 1·0	2·9		Kasargode *	42·7	+4·5	58·4
	Anantapur	1·3	—	5·1		Nileshwar *	36·3	- 5·0	48·2
	Rentachintala	2 6	—	6·4		Mangalore	48·3	+11·5	59 9
	Cuddapah	3·4	+0·5	5·2					
	Anantharaju-pet *	3·9	—	—	Mysore and Coorg	Chitaldrug	3·8	+1·0	6·5
Carnatic	Nellore	0·9	- 0·4	3·4		Bangalore	2·6	- 0·2	10·2
	Madras	2·8	+0·9	6·8		Mysore	3·2	+0·3	15·5
	Palur *	2·8	+0·9	8·7		Mercara	40·5	+14·1	52·7
	Tindivanam *	0·5	- 1·7	6·8					
	Cuddalore	1·3	- 0·3	7·2	Hills.	Kodaikanal	5·7	+1·7	18·8
Central	Vellore	2·5	+0·1	6·4		Coonoor*	4·7	—	30·4
	Salem	3·5	+0·5	15·9		Ootacamund *	9 7	+4·7	23·5
	Coimbatore	1·5	- 0·2	7·5		Nanjanad *	11·7	+3·5	26·2
	Coimbatore Res. Inst. *	1·5	+0·1	7·3					
	Trichinopoly	2 0	+0·6	8·8					

* Meteorological Stations of the Madras Agricultural Department.

@ From average rainfall for the month calculated upto 1935 (published in Fort St. George Gazette).

Summary of General Weather Conditions. The monsoon was active almost throughout the month on the West Coast and in the North Madras Coast and was especially active in the West Coast at the end of this month.

Two depressions influenced the weather in the Circars during this month. The first depression formed in the north of the Bay on the 11th, and after developing into a storm crossed the Orissa Coast on the 12th--13th and moving in a W. Nw. direction filled up over West Central India on the 18th and caused heavy rains on the Orissa Ganjam Coast and along its line of traverse stimulated the monsoon on the West Coast and over the peninsula generally.

The second depression formed in the Bay between Chandbali and the Sandheads on the 26th passed inland near Chandbali on the 28th. This depression also gave heavy rain along the Orissa-Ganjam-Coast, and caused a strong monsoon on the West Coast and the Peninsula.

Rainfall was in very large excess locally in the Circars and in South Canara and Coorg and was nearly normal elsewhere.

Day temperatures were generally below normal in the areas of heavy rainfall.

Weather Report for the Research Institute Observatory :—

Report No. 6/36.

* Absolute Maximum in shade	92·0°F
* Absolute Minimum in shade	70·3°F
* Mean Maximum in shade	85·4°F
Departure from normal (of the month) ...	−3·8°F
* Mean Minimum in shade	71·6°F
Departure from normal (of the month) ...	−1·5°F
Total Rainfall for the month	1·46″
Departure from normal	+0·12
Heaviest fall in 24 Hours (Recorded on 29th.)...	0·52″
Total number of rainy days	4 Days.
Mean daily wind velocity	6·3 M. P. H.
* Mean Humidity at 8 hours	70·4 %
Departure from normal (of the month) ...	+1·1

* Temperatures were recorded only from 18th June.

The monsoon was fairly active during the month and rainfall was in slight excess. Day temperature was in large defect during the latter half of the month.

P. V. R. & D. V. K.

Departmental Notifications.

Leave. Mr. K. P. Anantanarayanan, Assistant in Entomology, l. a. p. for 2 months. Mr. C. A. S. Ramalingam Pillai, A. A. D., Manamadura, l a. p. for 6 weeks on M. C. Mr. N. Krishnaswami, Millet Assistant, leave out of India on half average pay for 28 months.

Postings and Transfers. Mr. K. Ambikacharan, A. D., Hindupur to iv Circle. Cuddalore Division. Mr. K. Guruswami Nayudu, F. M., Kalahasti is posted Livestock Research Station. Mr. T. Ramanugal Naidu, posted to Tenali for Dt, Work. A. Ramaswami Iyer, Offg. A. D. A., Madura posted to iv Circle for opening a new sub circle at Arkonam. Mr. P. N. Krishnaswami Rao, Assistant in Cotton, Guntur transferred to C. S. Section, Coimbatore. Mr. T. T. Devasighamony, F. M., on Probation Hagary to Dhone as A. D.